

Fires, Explosions and Toxic Releases: Implications for Post 9-11 Training

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Board Member



Training From the Inside Out NIEHS-WETP Meeting

Research Triangle Park, NC

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Independent Federal Agency

- Five member Board appointed by President and Senate for 5 year terms
- Jointly responsive to Congress and President
- Began operations de novo in 1998
- Funding \$8 M; staff 35+
- Mission to investigate and promote the prevention of major chemical accidents at fixed facilities
- Subpoena power; recommendation emphasis
- Emphasis on accidents that affect or could potentially affect the public
- Safety Studies are a priority (reactive hazards, dust explosions)



April 16, 1947 Texas City, TX

Key Facts

- 600 killed; 3500 injured
- NH_4NO_3 ship explosions
- extensive damages at other facilities from initial blast
- safety/technology transfer issues



Grande Camp Explosion



December 2-3, 1984 Bhopal, India

Key Facts

- 6000 killed; 300,000 injured
- runaway reaction
MIC and HCN
- multinational corporation
- design,
intermediate
storage, mechanical
integrity, staffing
- policy stimulus



Union Carbide, India



U.S. Chemical Accidents

Profile: 5-Yr data (1994-99) on EPA RMP* Processes:

~15000 reporting facilities

» 1900 accidents

33 deaths; ~ 1900 injuries

> 200,000 civil evacuations or shelterings

- Insurance firms pay out ~ \$1B/yr to cover firm's US losses
- Total accident losses by chemical firms is ~ \$3-5 B/yr

* only one of 20+ CSB investigations involve RMP processes

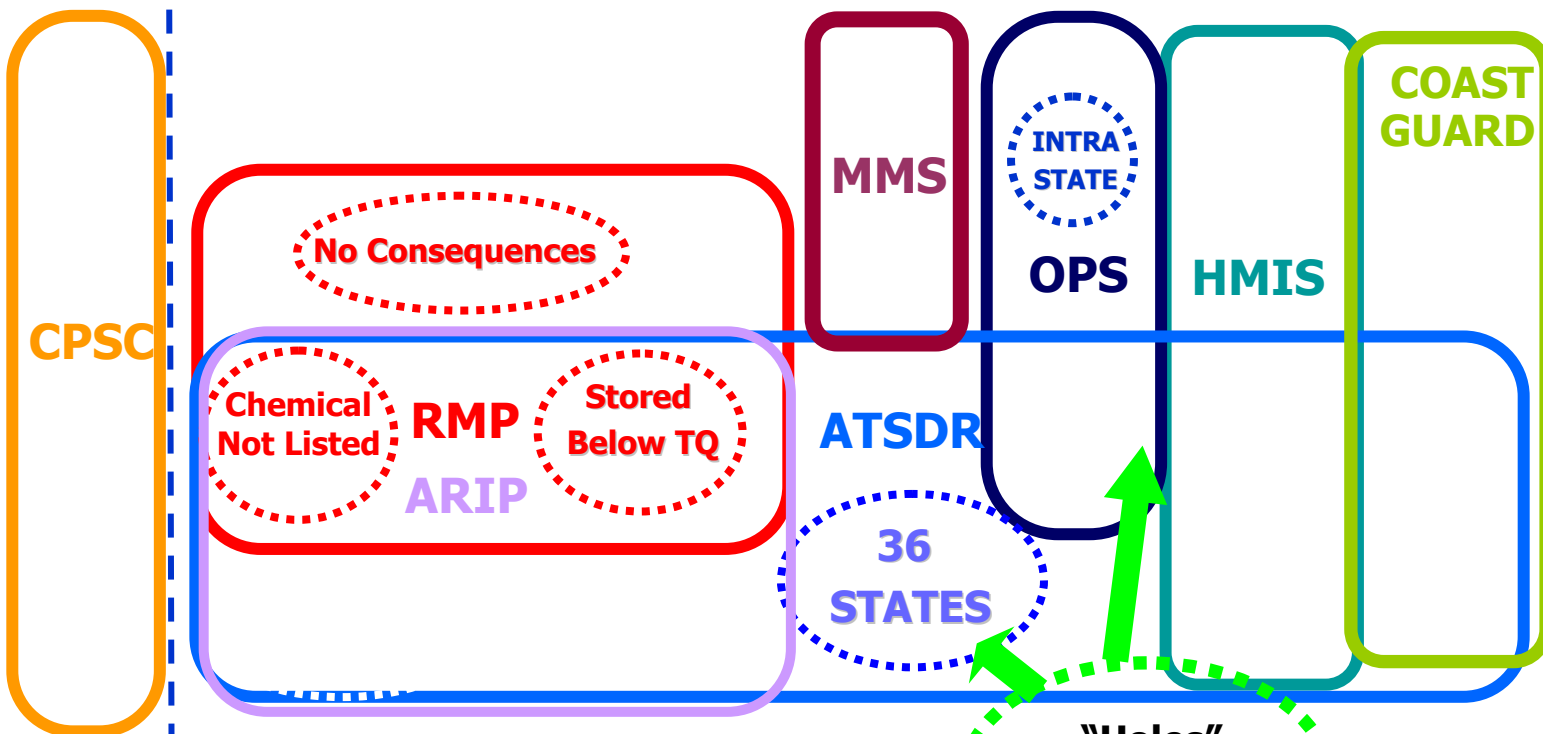
Basic Scope of Existing Chemical Incident Data Sources



FIXED FACILITIES

TRANSPORTATION

Heavy Hydrocarbon
Light Hydrocarbon
Toxic
Flammable
Reactive



Scope of this Report

Source: Dr. Sam Mannan, MKOPSC

Under Reporting due to Low Quantity Storage

- Hydrogen Sulfide
(RMP 19 incidents in 5 years vs.
HSEES 70 incidents in 1 year)
- Sulfur Dioxide
(RMP 48 incidents in 5 years vs.
HSEES 494 incidents in 1 year)

Source: Dr. Sam Mannan, MKOPSC



Chemical Repackaging and Distribution

KEY ISSUES

- Mechanical Integrity
- Emergency Shutdown
- Emergency Response
- Public Notification



DPC Enterprises

Festus, MO (08/14/2002)



Hazardous Waste Disposal Incident (36 injured; 14 public; 6 Firefighters)



Kaltech
Industries
Group
Manhattan,
NYC
(04/25/2002)

KEY ISSUES

Reactive hazards

Siting and Fire Codes

Hazard recognition and communication



Chemical Processing Incident (minor injuries)



KEY ISSUES

Reactive hazards

Siting of Buildings

Community Notification

First Chemical

Pascagoula, MS (10/13/2002)

Improving Reactive Hazard Management - Conclusions

1. Reactive incidents are a significant national safety problem, occurring wherever chemicals are stored, handled, or used.
2. Federal regs are inadequate: coverage, scope, incident tracking and public access.
3. Good reactive hazard management requires addressing chemical combinations under process-specific conditions.
4. Progress towards preventing reactive incidents requires enhanced regulatory and non-regulatory programs.



Kletz's Inherently Safer Approaches

- Intensification
- Substitution
- Attenuation
- Limitations of Effects
- Simplification/Error Tolerance



Layers of Protection Prevention Hierarchy

- Inherently safer design
- Basic controls, process alarms
- Critical alarms, operator supervision
- Automated action SIS or ESD
- Physical protection (relief devices, dikes)
- Plant emergency response
- Community emergency response



September 21, 2001 Toulouse, France

Key Facts

- NH_4NO_3 explosion
- 30 killed, some off-site 800 hospitalized, 2400 injured
- 3.4 on the Richter scale, 50 foot crater
- 500 homes uninhabitable; 85 schools damaged
- Releases and damages at other facilities
- Broad policy impact



AZF Agrochem Facility, Toulouse, FR



Specialty Plastics Manufacturing (6 Deaths, 30+ injured)

Key Issues

Community
damage

Business continuity

Dust hazard
recognition

NFPA Code
awareness



West Pharmaceutical Kinston, NC (1/29/2003)



Insulation Products Explosion and Fire (7 Deaths, 40+ injured, 10,000 jobs)

KEY ISSUES

Combustible dust
explosion

Hazard
recognition

Cleaning practices

Code Awareness
and adherence



CTA Acoustics

Corbin, KY (2/20/03)



CSB on the Web

www.chemsafety.gov